

North of the Delta  
Offstream Storage Investigation

# **Progress Report Appendix E: Amphibian and Reptile Survey Summary**

April 2000

Integrated  
Storage  
Investigations

CALFED  
BAY-DELTA  
PROGRAM

North of the Delta  
Offstream Storage Investigation

# **Progress Report Appendix E: Amphibian and Reptile Survey Summary**

**Report prepared by:**  
**Charlie Brown**  
**Department of Fish and Game**

**Assisted by:**  
**Waiman Yip**  
**Department of Water Resources**  
**Division of Planning and Local Assistance**

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# Amphibian and Reptile Survey Summary

## Introduction

In late 1997, the Department of Water Resources began a two-year reconnaissance level study of North of the Delta Offstream Storage, authorized by Proposition 204—the Safe, Clean, Reliable Water Supply Act approved by voters in 1996. In early 1999, CALFED consolidated all storage investigations under a comprehensive program called Integrated Storage Investigations. The North of the Delta Offstream Storage Investigation was incorporated into one of seven ISI program elements.

The North of the Delta Offstream Storage Investigation analyzes engineering, economic, and environmental impact to determine the feasibility of four north-of-the-Delta storage projects. The four potential alternatives are Sites Reservoir, Colusa Project, Thomes-Newville Project, and Red Bank Project (Figure 1). Phase I, currently underway, includes preliminary field surveys of environmental resources and extensive field surveys of cultural resources, geological, seismic, and foundation studies, and engineering feasibility evaluation. Phase II will start when CALFED's Record of Decision and Certification for the Programmatic EIR/EIS is completed and if North of Delta Offstream Storage is consistent with CALFED's preferred program alternative. Phase II will include completion of necessary fish and wildlife surveys, evaluations of potential mitigation sites, preparation of project-specific environmental documentation, final project feasibility reports, and the acquisition of permits necessary to implement the project.

Under Phase I, the Department of Fish and Game conducted studies of fish and wildlife resources in each project area. This appendix summarizes surveys of amphibians and reptiles in the four proposed project areas. The information gathered will be used to describe impacts on fish and wildlife resources during the planning process.

### Contract with DFG

Amphibian and reptile studies were initiated in 1997 for Red Bank, Sites, and Colusa Projects. DFG collected data on occurrence, distribution, and relative abundance of amphibians and reptiles at the proposed reservoir inundation areas for these projects. DFG also reviewed past amphibian and reptile studies for Red Bank and Thomes-Newville Projects.



## Report Organization and Content

Results and findings of past studies and recently conducted surveys of amphibians and reptiles in the proposed project areas are discussed in this appendix. The general survey procedures used in the recent surveys at Sites, Colusa, and Red Bank Project areas are discussed below. The specific sampling data and results of these surveys and past studies are discussed in respective sections for each proposed project area. Findings of species with special status are summarized at the end of this appendix.

## Methodology

DFG staff conducted surveys for amphibians and reptiles from August 1997 through spring 1999 in Sites, Colusa, and Red Bank Project areas. The surveys included threatened or endangered species, Species of Concern, and common species of amphibians and reptiles.

The Stebbins field guide (1985) was used to determine historic ranges of the species. DFG staff also used physical observation of the present habitat, historic records, and DFG's Natural Diversity Data Base to establish the list of potential species that could occur in the project areas (Table 1). The major focus of field surveys was to locate the special species listed in Table 1 that could potentially occur in the project area. Survey techniques used included night driving, dip netting, seining, and day and night ground searches in all weather conditions and seasons to find species of common amphibians and reptiles.

**Table 1. Special Species of Amphibians and Reptiles in Project Areas**

| Species                     | Status   | Project Area     |          |                              |
|-----------------------------|--|------------------|----------|------------------------------|
|                             |  | Sites and Colusa | Red Bank | Thomes-Newville <sup>1</sup> |
| <b>Amphibians</b>           |  |                  |          |                              |
| California red-legged frog  | Federally threatened                                       | X                | X        | X                            |
| California tiger salamander | Candidate for federal listing;<br>State Species of Concern | X                |          | X                            |
| Foothill yellow-legged frog | Federal and State Species of Concern                       | X                | X        | X                            |
| Western spadefoot toads     | Federal and State Species of Concern                       | X                | X        | X                            |
| <b>Reptiles</b>             |  |                  |          |                              |
| California horned lizard    | Federal and State Species of Concern                       | X                |          |                              |
| Western pond turtle         | Federal and State Species of Concern                       | X                | X        | X                            |

<sup>1</sup> Results from surveys of Thames-Newville Project area conducted in 1981-82

All habitats at the selected survey sections were identified and categorized as to type of water body (e.g., pond, farm impoundment, vernal pool, or creeks). All ponds were measured for length, width, and depth during the initial assessment in fall 1997. Aquatic vegetation, root-wads, water turbidity, and characterization of the surrounding terrain (e.g., degree of degradation, canopy, embankment, and soil type) were recorded during the initial assessment period and on all subsequent surveys. Staff visually inspected ponds at the time of the preliminary assessment to determine the presence of, and the ability to support, amphibians, reptiles, and fish. Once the ponds were located and assessed, they were assigned an identification code. Vernal pools were surveyed during spring 1998 and assigned an identification code. All ponds and vernal pools were marked on a topographical quad map by their appropriate code.

Creeks were divided into a maximum of three regions, depending on the length of each habitat type contained in the reservoir footprint. A total of eight transects were established to encompass vernal pools and support California tiger salamander surveys at the Sites and Colusa Project areas. California tiger salamander transects were assigned an identification code and marked on a topographic map. Other transects were established throughout the potential Sites, Colusa, and Red Bank Reservoir areas to encompass a variety of habitat types for general herpetology surveys. Photocopies of topographical maps were made of the specific areas to be surveyed for workers to take out into the field. Staff obtained permission to survey on private property from the property owners at least a week in advance of all surveys.

Survey data were collected in a standard 5 to 7 inch “write in the rain” notebook. At the end of the day, data for the California red-legged frog, California tiger salamander, and general herpetology surveys were transferred to a standardized data sheet from *A Standardized Protocol for Surveying Aquatic Amphibians, Technical Report NPS/WRUC/NRTRP-95-01*. All other data was photocopied and inserted into the appropriate binder. For general herpetology surveys, data was also transferred onto a CALFED Herpetology Investigation Field Observation Report. All data was transferred to a computer spreadsheet program. A photocopy of the topographical map with the area surveyed was highlighted and the location of any Species of Concern found marked on it was stapled to the data sheet. The surveyors present, the time of survey, environmental, and weather conditions were all recorded. The condition and type of the habitat were noted, including emergent and aquatic vegetation, turbidity of water, condition and predominant type of surrounding vegetation, and substrate. Land use or alteration was noted as well.

### **California Red-legged Frog**

Surveys for the California red-legged frog (*Rana aurora draytonii*), a federally threatened species, were conducted from August 1997 to January 1998 and from May through October 1998 in Sites, Colusa, and Red Bank Project areas. Surveys were not conducted during the breeding or rearing period of red-legged frogs to avoid disturbing breeding frogs, eggs, or larvae. All ponds and

creeks in the study area were surveyed a minimum of four times during the five-month period in 1998. Day surveys were performed on clear, sunny days with minimal wind. Night surveys were conducted on warm, still nights from an hour past sunset until midnight (U.S. Fish and Wildlife 1997).

Crews of two to nine people conducted surveys. The surveyors would often break up into teams or work as individuals to either walk the perimeter of the ponds or the length of the stream for both day and night surveys. Taking care not to disturb habitat, the shoreline of each pond or creek section was thoroughly inspected, with particular care to examine overhangs, root-wads, emergent vegetation, or other structures that are used as shelter by red-legged frogs. Two surveyors would walk in opposite directions at the water's edge, while two other surveyors would walk opposite directions at a distance of 17 to 33 feet from the water's edge. During night surveys, 6-volt battery lamps were used to scan the water surface for eye-shine (U.S. Fish and Wildlife 1997). Day surveyors used binoculars to scan ahead up to 50 feet to spot frogs before they jumped into the water. The survey team also used auditory identification of frog calls during day and night surveys. A single lens reflex camera was used to photograph any species of interest for future identification verification. Photographs were also taken of the environment in which animals were found, to confirm field notes and to document the state of the habitat when it was surveyed (Bury and Corn 1991).

### **California Tiger Salamander**

California tiger salamanders (*Ambystoma californiense*) are candidate species for federal listing, currently DFG Species of Concern, and are fully protected. The historic range of California tiger salamanders in the Sites and Colusa Project areas was determined using Stebbins field guide (1985). As in the California red-legged frog survey, a preliminary survey of the study area was done to assess the potential of California tiger salamander habitat. Grasslands, vernal pools, and farm pond impoundments that contained water for only part of the year were all examined as potential California tiger salamander habitat sites. All ponds, vernal pools, and the surrounding territory were examined for burrows, log debris, and type of terrestrial vegetation. Each pond was then seined. Transects were laid out within potential breeding habitat and grassland terrain (Brode 1993). Eight transects averaging about 0.62 by 0.31 miles were established.

Transect and visual pond inspections were conducted at night, during storms that continued from the day into the night, or when the air temperature was between 45-50° F or warmer between the months of November and March for both the 1997-98 and 1998-99 seasons.

For transects, the team members formed a line, keeping a distance of at least 17 feet between them. Six-volt flashlights were used to scan the terrain. All mammal burrows, cracks, logs, and debris in the transect were inspected for California tiger salamanders. A camera was brought to photograph adult specimens for future identification verification and to photograph the area in which they were found.

Visual pond surveys were performed by biologists who walked concentric circles around the pond starting with an inner circle at the water's edge, with walkers spanning out about 33 feet. Surveyors would walk in opposite directions around the pond, utilizing 6-volt flashlights to scan back and forth for animals. Any surrounding burrows or logs were inspected.

Dip netting and seining aquatic surveys were done twice a year for each vernal pool and intermittent pond, at least 15 days apart. The first survey was done between March 15 and April 15, and the second between April 15 and May 15. Only ponds that would hold water for at least 10 weeks during the survey time interval were inspected.

Initial samples were made using a 12-inch dip net with a 1/8-inch mesh. Each pond was divided so that the dip net sweeps would sample 50 percent of the surface area. Seining was done using one of three seines depending on the size of the pond, the largest seine being 60 feet long, 5 feet high, with a 1/4-inch mesh, and a 7 foot by 7 foot pocket. A medium sized seine was 29 feet long, 6 feet high, with a 1/4-inch mesh, and a pocket size of 7 feet by 5 feet. The third seine, used only for small ponds, was 12 feet long, 4 feet high, with a 1/4-inch mesh, and a 7 feet by 5 feet pocket. When possible, the seine would be pulled through the pond, arcing from one point around and back again, sweeping the whole pond at once. Large ponds had to be seined in sections.

## **Western Pond Turtle**

DFG biologists looked for western pond turtles (*Clemmys marmorata*), a federal and State Species of Concern, when seining or during daytime visual surveys in the project areas. Carapaces (shells) of dead turtles were also noted and measured. During periods of warm weather, biologists watched the creek when possible while traveling to and from work stations, which yielded positive results in locating western pond turtles. A general lookout for western pond turtles was established while driving or walking near creeks.

## **General Amphibian and Reptile**

General herpetology surveys were done by ground, searching ponds and transects, by seining, or by night driving studies in the Sites, Colusa, and Red Bank Project areas. Ground searches were done both day and night. Seining was done during the day. Driving surveys were only done at night. General amphibian and reptile surveys were conducted year-round throughout these project areas, when the weather was appropriate for amphibian and reptile activity.

Transects were walked by team members in a line, 17 feet apart. All logs, trees, burrows, rocks, and crevices were inspected for animals. Transect areas included riparian, grasslands, and oak woodlands. Binoculars were used to scan ahead for animals such as turtles and frogs (Bury and Corn 1991). Night transects were walked in the same manner, using 6-volt flashlights for

illumination. During the warmer seasons, biologist going to and from transects kept a general watch for reptiles and amphibians.

Ponds were inspected by both ground searches and seining. Teams of two to nine members spread out from the pond's edge to 33 feet away to conduct ground searches. Frog calls were noted as an auditory identification of species. A fine mesh minnow seine was pulled from one bank to the other to seine ponds. Trapped animals were identified by species and tallied. Hand-held dip nets were used to capture animals near the shore.

Night-driving surveys were conducted from a motor vehicle traveling at speeds between 15-25 mph (Brown et al 1987). Specimens found on the shoulder were identified and counted. Night drive routes included roads both within and surrounding the project area. These roads were traveled in both directions. During the warmer seasons, a general watch was made on the roadsides whenever surveyors were driving in the study area. A camera was used to photograph specimens for species verification and to maintain a general record of the find. Roads interior to the reservoir sites and immediately surrounding the project areas were driven a total of eight times in 1997 in the Sites and Colusa Project areas.

## **Sites and Colusa Projects**

Surveys for reptiles and amphibians were conducted by DFG employees from August 1997 through spring 1999 in the Sites and Colusa Project areas. The major objectives of these surveys were to search for California red-legged frogs, federally threatened; California tiger salamanders, candidate for federal listing and State Species of Concern; and to conduct general herpetology surveys. Four species listed as federal and California State Species of Concern that could potentially occur in the Sites and Colusa Project areas—foothill yellow-legged frogs, western pond turtles, western spadefoot toads, and California horned lizard—were also looked for during the course of this survey (DFG 1998).

## **Results**

A total of 2,400 hours were spent in the Sites and Colusa Project areas looking for reptiles and amphibians. A total of 19 species, 5 amphibians and 14 reptiles, were found during this survey (Table 2). Only one special species listed in Table 1 was found, the western pond turtle. These turtles are listed by the Natural Diversity Data Base as occurring in Colusa County. California red-legged frogs and California tiger salamanders were not found.

The most prevalent species found was the bullfrog. Bullfrogs, Pacific tree frogs, and western toads were the most commonly observed amphibians (Table 4). Western fence lizards were the most prevalent reptiles, with a catch per hour effort ratio of 0.17 (Table 4).

**Table 2. Amphibian and Reptile Species Observed in the Sites and Colusa Project Areas**

| Common Name                      | Scientific Name                      |
|----------------------------------|--------------------------------------|
| <b>Amphibians</b>                |                                      |
| Bullfrog                         | <i>Rana catasbieana</i>              |
| California newt                  | <i>Taricha torosa</i>                |
| California slender salamander    | <i>Batrachoseps attenuatus</i>       |
| Pacific treefrog                 | <i>Hyla regilla</i>                  |
| Western toad                     | <i>Bufo boreas</i>                   |
| <b>Reptiles</b>                  |                                      |
| Aquatic garter snake             | <i>Thamnophis couchii</i>            |
| Common garter snake              | <i>Thamnophis sirtalis</i>           |
| Common king snake                | <i>Lampropeltus getula</i>           |
| Gopher snake                     | <i>Pituohpis catenifer</i>           |
| Ring neck snake                  | <i>Diadophis punctatus</i>           |
| Sharp tailed snake               | <i>Contia tenuis</i>                 |
| Southern alligator lizard        | <i>Elgaria multicoloranata</i>       |
| Western fence lizard             | <i>Sceloporus occidentalis</i>       |
| Western pond turtle <sup>1</sup> | <i>Clemmys marmorata</i>             |
| Western racer                    | <i>Coluber constrictor</i>           |
| Western rattlesnake              | <i>Crotalus viridus</i>              |
| Western sagebrush lizard         | <i>Sceloporus graciosus gracilis</i> |
| Western skink                    | <i>Eumeces skiltonianus</i>          |
| Western terrestrial garter snake | <i>Thamnophis elegans</i>            |

Seven-hundred-and-fifty hours were spent searching riparian habitat, which yielded the greatest diversity of species. Fourteen of the nineteen total species of reptiles and amphibians, all three frog species, and all but three reptile species were found in this type of habitat (Table 3). Bullfrogs and western toad larvae were also found in pools of the riparian zone.

Fourteen species of reptiles and amphibians were also found in the oak woodland habitat. Adults of all five species of amphibians and all but five species of reptiles were found in the oak woodlands.

A total of 2,060 hours was spent in ground searches. Ground searching was the most productive method of locating a variety of reptiles and amphibians, with an overall catch per hour effort ratio of 8.1 (Table 4). Representatives of all species found during the study were located via ground searches. Dip netting and seining were particularly effective in capturing semi-aquatic reptiles and amphibians, especially larval amphibians (Table 4).

<sup>1</sup> State and federal Species of Concern

During the winter and early spring of 1999, the vernal pools of the Sites and Colusa Project areas either remained dry or only held water for a week's time. The protocol for dip netting vernal pools for California tiger salamanders could not be met as a result.

**Table 3. Species Found in Each Habitat Type**

| <b>Common Name</b>               | <b>Riparian</b> | <b>Oak<br/>Woodland</b> | <b>Grassland</b> | <b>Farm<br/>Pond</b> | <b>Vernal<br/>Pool</b> | <b>Roads</b> |
|----------------------------------|-----------------|-------------------------|------------------|----------------------|------------------------|--------------|
| <b>Amphibians</b>                |                 |                         |                  |                      |                        |              |
| Bullfrog                         | X               | X                       | X                | X                    |                        |              |
| Bullfrog larvae                  | X               | X                       |                  | X                    |                        |              |
| California newt                  |                 | X                       |                  | X                    |                        |              |
| California slender salamander    |                 | X                       |                  | X                    |                        |              |
| Pacific treefrog                 | X               | X                       | X                | X                    | X                      |              |
| Pacific treefrog larvae          |                 |                         |                  | X                    | X                      |              |
| Western toad                     | X               | X                       | X                | X                    |                        |              |
| Western toad larvae              | X               |                         |                  | X                    | X                      |              |
| <b>Reptiles</b>                  |                 |                         |                  |                      |                        |              |
| Aquatic garter snake             | X               |                         |                  |                      | X                      |              |
| Common garter snake              | X               | X                       | X                | X                    | X                      |              |
| Common king snake                | X               |                         | X                | X                    |                        |              |
| Gopher snake                     | X               | X                       | X                | X                    | X                      |              |
| Ring neck snake                  |                 |                         |                  |                      | X                      |              |
| Sharp tailed snake               | X               |                         |                  |                      |                        |              |
| Southern alligator lizard        | X               | X                       | X                | X                    |                        |              |
| Western fence lizard             | X               | X                       | X                | X                    | X                      |              |
| Western pond turtle <sup>1</sup> | X               |                         |                  |                      |                        |              |
| Western racer                    | X               | X                       |                  |                      |                        |              |
| Western rattlesnake              | X               | X                       | X                | X                    |                        | X            |
| Western sagebrush lizard         |                 | X                       |                  |                      |                        |              |
| Western skink                    |                 | X                       |                  |                      |                        |              |
| Western terrestrial garter snake | X               | X                       |                  | X                    |                        |              |

<sup>1</sup> State and federal Species of Concern

**Table 4. Catch Per Hour Effort for Each Survey Method**

| <b>Common Name</b>               | <b>Ground Searching</b> | <b>Dip Netting</b> | <b>Seining</b> | <b>Night Driving</b> |
|----------------------------------|-------------------------|--------------------|----------------|----------------------|
| <b>Amphibians</b>                |                         |                    |                |                      |
| Bullfrog                         | 4.8                     | 0.7                | 1              | 0                    |
| Bullfrog larvae                  | 1.1                     | 0                  | 2.9            | 0                    |
| California newt                  | 0.003                   | 0                  | 0              | 0                    |
| California slender salamander    | 0.009                   | 0                  | 0.3            | 0                    |
| Pacific tree frog                | 1.2                     | 3.8                | 0.6            | 0                    |
| Pacific tree frog larvae         | 0                       | 27.6               | 0              | 0                    |
| Western toad                     | 0.5                     | 0.02               | 0.04           | 0                    |
| Western toad larvae              | 0.2                     | 13.4               | 7.1            | 0                    |
| <b>Reptile</b>                   |                         |                    |                |                      |
| Aquatic garter snake             | 0.0005                  | 0.009              | 0              | 0                    |
| Common garter snake              | 0.02                    | 0.04               | 0.02           | 0                    |
| Common king snake                | 0.003                   | 0                  | 0              | 0                    |
| Common racer                     | 0.0002                  | 0                  | 0              | 0                    |
| Gopher snake                     | 0.007                   | 0.009              | 0              | 0                    |
| Ring neck snake                  | 0.0005                  | 0                  | 0              | 0                    |
| Sharp tailed snake               | 0.0005                  | 0                  | 0              | 0                    |
| Southern alligator lizard        | 0.005                   | 0                  | 0              | 0                    |
| Western fence lizard             | 0.17                    | 0                  | 0              | 0                    |
| Western pond turtle <sup>1</sup> | 0.0009                  | 0                  | 0              | 0                    |
| Western rattlesnake              | 0.02                    | 0.009              | 0.06           | 0.2                  |
| Western sagebrush lizard         | 0.0005                  | 0                  | 0              | 0                    |
| Western skink                    | 0.006                   | 0                  | 0              | 0                    |
| Western terrestrial garter snake | 0.05                    | 0                  | 0.02           | 0                    |
| <b>Totals</b>                    | <b>8.1</b>              | <b>45.6</b>        | <b>12.1</b>    | <b>0.2</b>           |

## Discussion

The foothill yellow-legged frog, which occurs in both Glenn and Colusa counties and is listed by the DFG as a Species of Concern, was not observed in the project area. These frogs prefer the running waters of mid-sized streams.

Several reptile and amphibian species whose historic range may include the Sites and Colusa Project areas that were not observed include the Oregon salamander (*Ensatina escholtzii oregonense*), the black salamander (*Aneides flavipunctatus*), and the mountain king snake (*Lampropeltis zonata*). These species tend to prefer shaded oak woodlands of the arroyos to the west side of the project area.

Western spadefoot toad, rubber boas (*Charina bottea bottae*), and the California night snake (*Hypsiglena torquata nuchalata*) were expected to be found in the grasslands of the Antelope Valley, but were not.

Western pond turtles were found in the project area, as well as outside the reservoir footprint, both upstream and downstream. California red-legged frogs, which generally have a similar habitat preference as western pond turtles and are frequently found occupying the same areas (Jennings, Hayes, and Holland 1985), were not, however, found during these surveys. Further surveys of the streams and pools surrounding the reservoir inundation area will be conducted.

## **Red Bank Project**

DFG initiated studies of amphibians and reptiles in the Red Bank Project area in 1997. DFG also reviewed past studies as part of the Red Bank Investigations (Bill et al 1975, Smith 1987, Brown et al 1987). This summary briefly describes the results of current and past studies of amphibians and reptiles conducted on Cottonwood Creek and Red Bank Creek.

DFG staff conducted surveys for reptiles and amphibians from August 1997 through spring 1999 in the Red Bank Project area. The major objectives of these surveys were to search for California red-legged frogs (federally listed as threatened) and to conduct general herpetology surveys. Three species listed as federal and State Species of Concern that could potentially occur in the Red Bank Project area—foothill yellow legged frogs, western pond turtles, and western spadefoot toads—were also looked for during the course of these surveys (DFG 1998).

## **Results**

### ***Cottonwood Creek***

DFG conducted one-year reconnaissance-level studies of the Red Bank Project in 1986 (Brown et al 1987). Biologists spent about 25 hours searching the banks of Cottonwood Creek in the study area in 1986 and 125 hours searching in 1998. Two species listed as Species of Concern were found, foothill yellow-legged frogs and western pond turtles (Table 5). These two species were distributed throughout the study area.

During these studies, fourteen species of amphibians and reptiles were found. The most common species of amphibians observed in the Cottonwood Creek study area were foothill yellow-legged frogs (14.80/hr) and western toads (13.10/hr) (Table 6). The most common species of reptiles observed were common garter snakes (0.39/hr) and western pond turtles (0.17/hr) (Table 6).

**Table 5. Amphibians and Reptiles Observed in the Red Bank Project Area**

| Common Name                              | Scientific Name                      | Cottonwood Creek | Red Bank Creek |
|--|--------------------------------------|------------------|----------------|
| <b>Amphibians</b>                        |                                      |                  |                |
| Bullfrog                                 | <i>Rana catesbeiana</i>              | X                | X              |
| California red-legged frog <sup>1</sup>  | <i>Rana aurora draytonni</i>         |                  | X              |
| Foothill yellow-legged frog <sup>2</sup> | <i>Rana bolei</i>                    | X                | X              |
| Pacific tree frog                        | <i>Hyla regilla</i>                  | X                | X              |
| Western toad                             | <i>Bufo boreas</i>                   | X                | X              |
| <b>Reptiles</b>                          |                                      |                  |                |
| Common garter snake                      | <i>Thamnophis sirtalis</i>           | X                | X              |
| Common kingsnake                         | <i>Lampropeltis getulus</i>          | X                | X              |
| Gopher snake                             | <i>Pituophis malanoleucus</i>        | X                |                |
| Southern alligator lizard                | <i>Elgaria multicarinata</i>         | X                | X              |
| Western fence lizard                     | <i>Sceloperus occidentalis</i>       | X                | X              |
| Western pond turtle <sup>2</sup>         | <i>Clemmys marmorata</i>             | X                | X              |
| Western racer                            | <i>Coluber constrictor</i>           |                  | X              |
| Western rattlesnake                      | <i>Crotalus viridis</i>              | X                | X              |
| Western sagebrush lizard                 | <i>Sceloperus graciosus gracilis</i> | X                | X              |
| Western skink                            | <i>Eumeces skiltonianus</i>          | X                | X              |
| Western terrestrial garter snake         | <i>Thamnophis elegans</i>            | X                | X              |

**Red Bank Creek**

Biologists spent 75 hours searching Red Bank Creek and surrounding areas in 1986 and 300 hours in 1998. Biologists found two species listed as Species of Concern, the foothill yellow-legged frog and the western pond turtle (Table 5). These two species were distributed throughout the Red Bank Project study area. Biologists also observed a threatened species, the California red-legged frog, in 1986 and 1998 at Sunflower Gulch, a tributary to Red Bank Creek. Biologists found sixteen species of amphibians and reptiles (Table 5).

**Discussion**

The most common species of amphibians observed in the Red Bank study area were western toads (5.65/hr.) and foothill yellow-legged frogs (3.91/hr.) (Table 6). The most common species of reptiles observed were western terrestrial garter snakes (0.13/hr.) and western pond turtles (0.09/hr.) (Table 6).

<sup>1</sup> Listed as federally threatened species

<sup>2</sup> State and federal Species of Concern

**Table 6. Relative Abundance of Amphibians and Reptiles Observed in the Red Bank Project Area**

| Species                                  | Catch per hour   |                |
|--|------------------|----------------|
|  | Cottonwood Creek | Red Bank Creek |
| Amphibians                               |                  |                |
| Bullfrog                                 | 0.02             | 1.06           |
| California red-legged frog <sup>1</sup>  |                  | <0.01          |
| Foothill yellow-legged frog <sup>2</sup> | 14.8             | 3.91           |
| Pacific tree frog                        | 0.01             | 1.58           |
| Western toad                             | 13.1             | 5.65           |
| Reptiles                                 |                  |                |
| Common garter snake                      | 0.39             | 0.03           |
| Common king snake                        | 0.01             | 0.01           |
| Gopher snake                             | 0.05             | 0.01           |
| Southern alligator lizard                | 0.02             | 0.01           |
| Western fence lizard                     | 0.14             | 0.08           |
| Western pond turtle <sup>2</sup>         | 0.17             | 0.09           |
| Western racer                            |                  | 0.01           |
| Western rattlesnake                      | 0.12             | 0.01           |
| Western sagebrush lizard                 | 0.02             | 0.01           |
| Western terrestrial garter snake         | 0.15             | 0.13           |

The most significant finding in the current investigation is the confirmation of the presence of a California red-legged frog in Sunflower Gulch. One was observed in the same location in 1986 (Brown et al 1987). Extensive searches failed to find other red-legged frogs in the study area. It is probable that the population of red-legged frogs is very small at the site of the proposed Red Bank Project.

Two Species of Concern are plentiful throughout the Red Bank Project study area: the foothill yellow-legged frog and the western pond turtle. They were found in both Red Bank Creek and the South Fork of Cottonwood Creek.

### Thomes-Newville Project

DFG initiated studies of the impacts on fish and wildlife of a Thomes-Newville Project in 1979 as part of DWR's Thomes-Newville Reservoir planning studies. However, the planning studies were halted in 1982. DFG completed a report of its abbreviated studies in 1983 (Brown et al 1983). This section recapitulates the effort and results of DFG's 1981-82 field studies. No new studies of amphibians or reptiles at the Thomes-Newville Project area were undertaken during the recent investigations of offstream storage.

<sup>1</sup> Listed as federally threatened species

<sup>2</sup> State and federal Species of Concern

## Methods

Surveys for amphibians and reptiles in the Thomes-Newville Project area were conducted from April 1981 through May 1982. Before surveying began, it was necessary to determine the historic range and available suitable habitat of the threatened California red-legged frog and Species of Concern that might be present in the project area, such as the California tiger salamander, western pond turtle, foothill yellow-legged frog, and western spadefoot toad. This evaluation was made by physically observing the present habitat in conjunction with historic records, reviewing previous field data, and consulting professional and amateur organizations such as the Natural Diversity Database, the DFG Natural Heritage Division, and others involved in consulting or amateur herpetology in the study area. Biologists and herpetologists from State and federal agencies and environmental groups, as well as university and museum personnel, were also consulted on possible indigenous reptiles and amphibians in the study area.

Pitfall trapping was done in the Thomes-Newville Project area surveys. Square plywood roofs supported by wooden legs approximately 4.3 inches above the soil surface covered plastic 5.0 gallon buckets or 3 pound coffee cans that were buried so their open top was level with the soil surface. Animals seeking shelter would run under the roofs, fall into the can or bucket, and be trapped. The roofs prevented livestock and people from stepping into the traps.

Buckets measured 10.8 inches on the inside diameter and varied from 12.0 inches to 14.0 inches in depth. Their plywood roofs had 16.0-inch sides. Coffee cans measured 6.1 inches on the inside diameter and were 6.9-inches deep. Coffee can traps were constructed by burying one can with both lids removed above another with its bottom lid intact. This resulted in doubling the trap depth to 13.8 inches. The plywood roofs for these traps had 12.0-inch sides.

Two-hundred-and-nine traps were installed during the course of the survey, including 79 bucket traps and 130 can traps. The trapping effort included placing traps within each of the major habitat types found within the project site and surrounding areas. Grassland, oak savannah, pine-oak woodland, chaparral, and riparian areas comprised the major habitat types selected for pitfall trap installation.

Pitfall traps were checked four times per week from spring through early fall. During late fall and winter, traps were checked at least once per week. The increased frequency of trap checking during the warmer seasons coincided with increased terrestrial activity of many amphibian and reptile species. Captured amphibians and lizards were marked by clipping their toes in a predetermined sequence to obtain population estimates based on recaptures of marked individuals. These species regenerate their lost limbs.

Team members walked 16 feet apart in a line to search for amphibians and reptiles. All logs, trees, burrows, rocks, and crevices were inspected for animals. Areas searched included riparian, grasslands, and oak woodlands. Binoculars were

used to scan ahead for animals such as turtles and frogs. This method was most effective for snakes, lizards, toads, slender salamanders, and tree frogs. Night searches were walked in the same manner, using 6-volt flashlights for illumination. During the warmer seasons, a general watch for reptiles and amphibians was made by staff going to and from transects.

Searches of aquatic habitat in the Thames-Newville area included visual observations of animals on shore or in shallow water. Hand-held dip nets were used to capture animals near the shore. The study also included seining stock ponds and ephemeral pools in the project area, using a 50-foot beach seine.

Night drives occurred an average of six times per month in the Thames-Newville area. Night drives followed roads both within and surrounding the project boundaries. These roads were traveled in both directions. Night surveys were very successful in locating snakes, lizards, and toads. During the warmer seasons, a general watch was made on the roadsides whenever surveyors were driving in the study area. A camera was used to photograph specimens for species verification and to maintain a general record of the find.

## **Results**

This 1981-82 survey produced observations of 22 amphibian and reptile species that occur within the habitats in the project area and surrounding areas (Table 7). No estimate of population sizes was possible because of the small number of recaptures that occurred during the pitfall trapping.

**Table 7. Amphibians and Reptiles Observed in the Thames-Newville Project Area in 1982<sup>1</sup>**

| Common Name                              | Scientific Name                |
|--|--------------------------------|
| <b>Amphibians</b>                        |                                |
| Black salamander                         | <i>Aneides flavipunctatus</i>  |
| Bullfrog                                 | <i>Rana catesbeiana</i>        |
| California slender salamander            | <i>Batrachoseps attenuatus</i> |
| Foothill yellow-legged frog <sup>2</sup> | <i>Rana boylei</i>             |
| Pacific tree frog                        | <i>Hyla regilla</i>            |
| Western spadefoot toad <sup>2</sup>      | <i>Spea hammondi</i>           |
| Western toad                             | <i>Bufo boreas</i>             |
| <b>Reptiles</b>                          |                                |
| Common garter snake                      | <i>Thamnophis sirtalis</i>     |
| Common king snake                        | <i>Lampropeltis getulus</i>    |
| Gopher snake                             | <i>Pituophis malanoleucus</i>  |
| Sagebrush lizard                         | <i>Sceloporus graciosus</i>    |
| Sharp-tailed snake                       | <i>Contia tenuis</i>           |
| Southern alligator lizard                | <i>Elgaria multicarinata</i>   |
| Striped racer                            | <i>Masticophis lateralis</i>   |
| Western aquatic garter snake             | <i>Thamnophis couchi</i>       |
| Western fence lizard                     | <i>Sceloporus occidentalis</i> |
| Western pond turtle <sup>2</sup>         | <i>Clemmys marmorata</i>       |
| Western racer                            | <i>Coluber constrictor</i>     |
| Western rattlesnake                      | <i>Crotalus viridis</i>        |
| Western skink                            | <i>Eumeces skiltonianus</i>    |
| Western terrestrial garter snake         | <i>Thamnophis elegans</i>      |
| Western whiptail                         | <i>Cnemidophorus tigris</i>    |

Western toads, Pacific tree frogs, and western fence lizards were found in all habitat types. Gopher snakes and western rattlesnakes were also found in most habitat types. Some species such as black salamanders and western sagebrush lizards were much more limited in their distribution (Table 8).

<sup>1</sup> Scientific names are taken from Collins 1997

<sup>2</sup> State and federal Species of Concern

**Table 8. Amphibian and Reptile Species Found in the Thomes-Newville Project Area in 1982**

| Species                                  | Oak       |           | Oak       |           |                 | Standing Water |          |
|--|-----------|-----------|-----------|-----------|-----------------|----------------|----------|
|  | Grassland | Chaparral | Savannah  | Woodland  | Riparian Stream |                |          |
| <b>Amphibians</b>                        |           |           |           |           |                 |                |          |
| Black salamander                         |           |           |           | X         |                 |                |          |
| Bullfrog                                 |           |           |           |           | X               | X              | X        |
| California slender salamander            | X         | X         | X         | X         |                 |                |          |
| Foothill yellow-legged frog <sup>1</sup> |           |           |           |           | X               | X              | X        |
| Pacific tree frog                        | X         | X         | X         | X         | X               | X              | X        |
| Western spadefoot toad <sup>1</sup>      | X         |           | X         |           |                 |                |          |
| Western toad                             | X         | X         | X         | X         | X               | X              | X        |
| <b>Reptiles</b>                          |           |           |           |           |                 |                |          |
| Common garter snake                      | X         |           |           |           | X               | X              | X        |
| Common king snake                        | X         | X         | X         | X         |                 |                |          |
| Gopher snake                             | X         | X         | X         | X         | X               |                |          |
| Sagebrush lizard                         |           | X         |           |           |                 |                |          |
| Sharp-tailed snake                       | X         | X         |           |           |                 |                |          |
| Southern alligator lizard                | X         | X         | X         | X         | X               |                |          |
| Striped racer                            | X         | X         |           |           |                 |                |          |
| Western aquatic garter snake             |           |           |           |           | X               | X              |          |
| Western fence lizard                     | X         | X         | X         | X         | X               | X              | X        |
| Western pond turtle <sup>1</sup>         |           |           |           |           | X               | X              | X        |
| Western racer                            | X         | X         | X         |           | X               |                |          |
| Western rattlesnake                      | X         | X         | X         | X         | X               |                |          |
| Western skink                            | X         | X         | X         |           |                 |                |          |
| Western terrestrial garter snake         | X         |           | X         |           | X               | X              | X        |
| Western whiptail                         |           | X         | X         | X         |                 |                |          |
| <b>Total number of species observed</b>  | <b>15</b> | <b>14</b> | <b>13</b> | <b>10</b> | <b>13</b>       | <b>8</b>       | <b>8</b> |

Ground searching proved to be the most successful method of observation in terms of the number of species it produced. This method accounted for 90.9 percent of all species found. Night driving yielded 63.6 percent, followed by pitfall trapping and searches of aquatic habitats, each of which produced 40.9 percent of all species found.

Pitfall traps tended to trap amphibians, lizards, and smaller snakes, such as the sharp-tailed snake (*Contia tenuis*). Larger snakes, because of their length, could easily avoid falling into the traps. This trapping method failed to provide any amphibian or reptile species not found by at least one other collection method.

<sup>1</sup> State and federal Species of Concern

Time limitations and lack of access prevented use of the beach seine except on one occasion in April 1982. A stock pond with a surface area of approximately 0.1 acre, located adjacent to Newville Road and about 0.25 mile south of the bridge near the Tehama-Glenn County line, was seined in April 1982. One seine haul yielded 13,761 Pacific tree frog tadpoles and two western spadefoot toad tadpoles. Several adult bullfrogs (*Rana catesbeiana*) were observed, but no adult or larval salamanders were found (Table 9).

**Table 9. Observation and Capture Methods for Amphibian and Reptile Species in the Thomes-Newville Project Area in 1982**

| Species                                  | Observation or Capture Method |               |                  |                 |
|--|-------------------------------|---------------|------------------|-----------------|
|  | Pitfall Trapping              | Night Driving | Ground Searching | Aquatic Surveys |
| <b>Amphibians</b>                        |                               |               |                  |                 |
| Black salamander                         |                               |               | X                |                 |
| Bullfrog                                 |                               | X             |                  | X               |
| California slender salamander            | X                             |               | X                |                 |
| Foothill yellow-legged frog <sup>1</sup> |                               | X             | X                | X               |
| Pacific tree frog                        | X                             | X             | X                | X               |
| Western spadefoot toad <sup>1</sup>      | X                             | X             | X                | X               |
| Western toad                             |                               | X             |                  | X               |
| <b>Reptiles</b>                          |                               |               |                  |                 |
| Common garter snake                      |                               | X             | X                | X               |
| Common king snake                        |                               | X             | X                |                 |
| Gopher snake                             |                               | X             | X                |                 |
| Sagebrush lizard                         |                               |               | X                |                 |
| Sharp-tailed snake                       | X                             |               | X                |                 |
| Southern alligator lizard                | X                             | X             | X                |                 |
| Striped racer                            |                               | X             | X                |                 |
| Western aquatic garter snake             |                               |               | X                | X               |
| Western fence lizard                     | X                             | X             | X                |                 |
| Western pond turtle <sup>1</sup>         |                               |               | X                | X               |
| Western racer                            |                               | X             | X                |                 |
| Western rattlesnake                      |                               | X             | X                |                 |
| Western skink                            | X                             |               | X                |                 |
| Western terrestrial garter snake         | X                             | X             | X                | X               |
| Western whiptail                         | X                             |               | X                |                 |
| <b>Total number of species observed</b>  | <b>9</b>                      | <b>14</b>     | <b>20</b>        | <b>9</b>        |

Although no amphibian or reptile species listed as rare or endangered occurred in the project area, three species considered of special concern to the State of California because of habitat losses complete their reproductive cycle in

<sup>1</sup> State and federal Species of Concern

both temporary and permanent ponds found throughout the inundation area. western spadefoot toads, foothill yellow-legged frogs, and western pond turtles occur in the streams coursing through the reservoir site.

## Discussion

DFG believe this survey found most, if not all, of the different amphibian and reptile species occurring within the reservoir site and surrounding areas. Two notable exceptions, the ringneck snake (*Diadophis punctatus*) and the night snake (*Hypsiglena torquata*), may occur here, based on habitat descriptions and range maps presented in Stebbins (1966). The survey failed to find either of these species.

The combination of survey methods proved adequate for their purpose. These methods seem well suited for a short-term survey such as this, since they allow a great deal of territory to be covered in a brief period of time. Although accurate estimates of amphibian and reptile species are difficult or impossible to make using these methods, they do appear to provide reliable qualitative inventory of which species are present.

The pitfall trapping method required a relatively large amount of preparation time compared to the results it produced. Approximately three person-months were spent obtaining materials and installing traps. Had the survey continued through summer 1982 and spring 1983, enough recaptures of marked individuals may have occurred to allow population estimates to be made. In general, it appears that studies of this sort, faced with uncertain funding, should concentrate on finding species present using methods that require less preparation time.

## Summary of Special Species Findings

Table 10 summarizes the observations of species with special status in each project area. The findings for Sites, Colusa, and Red Bank Project areas are a result of recent surveys, while those of Thomes-Newville Project area are the result of past surveys.

Western pond turtles, a federal and State Species of Concern, was found in the Sites and Colusa Project area. No other Species of Concern were found in the potential project area during these surveys. However, California red-legged frogs, a federally threatened species, generally have a similar habitat preference as western pond turtles and are frequently found occupying the same areas. Further surveys of the area surrounding the proposed inundation area will be conducted.

In comparison, a California red-legged frog and several Species of Concern were found at the proposed Red Bank Project area. Foothill yellow-legged frogs and western pond turtles were found in both Red Bank and Cottonwood Creeks.

A number of Species of Concern were also found at the Thomes-Newville project area in earlier surveys. Foothill yellow-legged frogs, western spadefoot toads, and western pond turtles were all found in 1981-82 field studies.

**Table 10. Special Species of Amphibians and Reptiles Observed in Project Areas**

| Species                     | Status  | Project Area     |          |                              |
|-----------------------------|---|------------------|----------|------------------------------|
|                             |   | Sites and Colusa | Red Bank | Thomes-Newville <sup>1</sup> |
| <b>Amphibians</b>           |   |                  |          |                              |
| California red-legged frog  | Federally threatened                                    |                  | X        |                              |
| California tiger salamander | Candidate for federal listing; State Species of Concern |                  |          |                              |
| Foothill yellow-legged frog | Federal and State Species of Concern                    |                  | X        | X                            |
| Western spadefoot toads     | Federal and State Species of Concern                    |                  |          | X                            |
| <b>Reptiles</b>             |   |                  |          |                              |
| California horned lizard    | Federal and State Species of Concern                    |                  |          |                              |
| Western pond turtle         | Federal and State Species of Concern                    | X                | X        | X                            |

<sup>1</sup> Results from surveys of Thomes-Newville Project area conducted in 1981-82

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